

Remarks/Arguments

Claims 8 and 10-11 are amended in this application. Claims 12-13 remain unamended.

Claim 8 has been amended to more clearly recite the connection of the first and second substrates to each other and to a further circuit carrier. The feature of at least one contact of the connector connecting the first and second substrate being adapted to also connect the first or the second substrates to a further circuit carrier, or to connect the first and the second substrate as well as both substrates to the further circuit carrier, has been clarified. This feature is disclosed in lines 11-14 of page 3 of the original specification.

The feature of the contact electrically connecting either the first or the second substrate to the further circuit carrier, or connecting the first and the second substrate, and further connecting both substrates to the further circuit carrier, is also clearly disclosed on page 5, line 35 to page 6, line 2 of the original specification. This also encompasses the reverse situation, in which the contact is electrically connected to the second substrate, but is not electrically connected to the first substrate. Further, the feature of the frame of the housing laterally surrounding at least one of the substrates has been clarified. This feature is clearly disclosed in Figure 1. The feature of the frame of the housing surrounding both of the substrates is clearly disclosed on page 2, lines 31-34 of the original specification.

Claim 10 has been amended to provide proper antecedent basis for terms used.

The feature of the connector electrically connecting the first and the second substrate has been added to amended claim 11 to be consistent with the wording of amended claim 8.

No new matter has been added.

35 U.S.C. §103

Claims 8 and 10-13, stand rejected under 35 U.S.C. §103(a) as being unpatentable over Ammar et al. (U.S. Publication No. 2005/0124307), hereinafter referred to as “Ammar”, and in view of Fujishima et al. (Patent No. JP09097993A), hereinafter “Fujishima”.

It is respectfully asserted that neither Ammar nor Fujishima, alone or in combination, disclose an RF unit comprising:

“a housing accommodating at least the first substrate, wherein the housing comprises a frame laterally surrounding at least one of the substrates, the frame forming a tubular structure having a length corresponding to the height of the frame and having one or two open main surfaces,...wherein a connector is provided that electrically connects the first and the second substrates, wherein the connector has one or more contacts extending through the first and the second substrate and beyond the height of the frame of the housing and electrically connecting the first or the second substrate of the RF unit to a further circuit carrier, or electrically connecting the first and the second substrate of the RF unit to the further circuit carrier”,

as described in currently amended claim 8.

Among the problems addressed by the present invention is the need for an RF unit with reduced size without the need to change existing manufacturing equipment. If components are placed on both sides of a carrier substrate, a double re-flow soldering process has to be used, which incurs further processing steps. This approach has limitations with regard to design and manufacturing cost because small components normally are more expensive and existing manufacturing equipment may become obsolete and has to be replaced. (Specification, page 1)

To address these problems, the present application describes an RF unit comprising a tuner and a mixer, the tuner or the tuner and the mixer being arranged on a first substrate and the mixer and the demodulator or the demodulator being arranged on a second substrate. The RF unit further comprises a housing accommodating at least the first substrate, the housing comprising a frame laterally surrounding at least one of the substrates. The frame forms a tubular structure having a length corresponding to the height of the frame and having one or two open main surfaces. The first and second substrates are arranged in parallel on respective different levels. Means are provided that maintain a predetermined distance between the first and the second substrate. A connector is provided that electrically connects the first in the second substrates. The connector has one or more contacts extending through the first and the second substrate and beyond the height of the frame of the housing and electrically connecting the first or the second substrate of the RF unit to a further circuit carrier, or electrically connecting the first and second substrate of the RF unit to the further circuit carrier.

This arrangement provides the advantages of simpler manufacturing, and testing provisionally assembled substrates, without the housing hampering access to test points on the respective substrates. A further advantage resides in the possibility to complete the RF unit and connect components at the underside of the lower substrate in a single wave soldering process once the first and second substrates are attached to each other. The invention further advantageously allows for reducing the length of interconnections between the two substrates by removing the need for routing the connection via the further circuit carrier, while at the same time providing a connection to a PCB to which the RF unit is mounted.

In contrast, Ammar teaches “an indoor unit (IDU) and compact outdoor unit (ODU) having an intermediate frequency/modem circuit, millimeter wave transceiver circuit, and digital interface between the IDU and the ODU capable of up to about 100 MBps data rate over at least about a 300 meter cable. The system uses a conversion to the polar coordinate system completes calculations in the polar coordinate system, reducing the computational requirements, and therefore, the size and cost of the system.” (Ammar Abstract)

As discussed in the reply to the previous office action, Ammar does disclose a block diagram showing an RF BOARD, a FREQ. BOARD and an IF/MODEM BOARD and their interconnection. (Ammar, Figure 3) Ammar does not, however, as admitted in the Office Action, disclose arrangement of these functions on first and second substrates on parallel levels, or any kind of housing accommodating the substrates, or a connector connecting the substrates and/or a further circuit carrier. Thus, Ammar fails to disclose an RF unit comprising: “a housing accommodating at least the first substrate, wherein the housing comprises a frame laterally surrounding at least one of the substrates, the frame forming a tubular structure having a length corresponding to the height of the frame and having one or two open main surfaces,... wherein a connector is provided that electrically connects the first and the second substrates, wherein the connector has one or more contacts extending through the first and the second substrate and beyond the height of the frame of the housing and electrically connecting the first or the second substrate of the RF unit to a further circuit carrier, or electrically connecting the first and the second substrate of the RF unit to the further circuit carrier”, as described in currently amended claim 8.

Fujishima teaches a “high-frequency apparatus to increase the degree of freedoms of a master board and to reduce the size by providing first and second boards having substantially the same size and independent functions substantially in parallel, and forming the opposed surface side of the first board to the second board as an earth pattern.” (Fujishima Abstract, translation)

Fujishima shows, in Figures 1 and 2, two substrates (101, 102), apparently of an RF unit, which substrates are arranged in parallel inside a housing (103) at different levels. The substrates are connected by a connector (106). However, the connector has no contact extending through the first and the second substrate in such a way that it extends beyond the frame of the housing and that it can be used for mounting and connecting the RF unit to a further circuit board. Rather, each one of the substrates has individual connectors (104, 105) arranged in such a way that they can exclusively be used for mounting the RF unit to a PCB. Figures 1, 2, 4, 5 and 6 clearly show that the connectors for mounting the RF unit to a PCB are arranged perpendicular to the connector provided for interconnecting the substrates. The connectors (104, 105) provided for mounting the RF unit to the PCB clearly

cannot be used for directly interconnecting the first and second substrates. Further, the housing disclosed in Fujishima is not a single housing. (Fujishima, Figures 5 and 6) If the housing of Fujishima were a single housing, mounting of the first and second substrates would be impossible due to the connectors (104, 105) that protrude sideways from the housing, orthogonal to the direction in which the connector is engaged, which connects the first and second substrates.

Furthermore, as described in claim 8 of the present application, at least one of the connectors having one or more contacts extending through the first and the second substrate and is being adapted for mounting and connecting the RF unit to a circuit board to which the RF unit is mounted. In contrast, Fujishima discloses separate connectors for individually connecting the substrates to a further circuit board and for interconnecting the substrates. Fujishima fails to disclose a connector with contacts protruding through both substrates and having a length sufficient to make contact with a circuit board to which the RF unit is mounted, or using this kind of contacts for connecting one or both substrates to the circuit board. Rather, Fujishima suggests using individual connectors for connecting the substrates with each other and for connecting the individual substrates with a circuit board to which the RF unit is mounted.

Even if a person of ordinary skill in the art combined the teachings of Ammar and Fujishima, the resulting combination would still have individual connectors for interconnecting the first and second substrates and for mounting and connecting the RF unit to a further circuit carrier. Neither Ammar nor Fujishima discloses, teaches, or suggests using the same connector for both purposes. Thus, Fujishima, like Ammar, fails to disclose an RF unit comprising: “a housing accommodating at least the first substrate, wherein the housing comprises a frame laterally surrounding at least one of the substrates, the frame forming a tubular structure having a length corresponding to the height of the frame and having one or two open main surfaces,...wherein a connector is provided that electrically connects the first and the second substrates, wherein the connector has one or more contacts extending through the first and the second substrate and beyond the height of the frame of the housing and electrically connecting the first or the second substrate of the RF unit to a

further circuit carrier, or electrically connecting the first and the second substrate of the RF unit to the further circuit carrier”, as described in currently amended claim 8.

In view of the above remarks and amendments to the claims, it is respectfully submitted that there is no 35 USC 112 enabling disclosure provided by Ammar nor Fujishima, alone or in combination, that makes the present invention as claimed in currently amended claim 8 unpatentable. Since dependent claims 10-13 are dependent from allowable independent claim 8, it is respectfully submitted that they too are allowable for at least the same reasons that claim 8 is allowable. Thus, it is further respectfully submitted that this rejection has been satisfied and should be withdrawn.

Having fully addressed the Examiner’s rejections it is believed that, in view of the preceding amendments and remarks, this application stands in condition for allowance. Accordingly then, reconsideration and allowance are respectfully solicited. If, however, the Examiner is of the opinion that such action cannot be taken, the Examiner is invited to contact the applicant’s representative at (609) 734-6804, so that a mutually convenient date and time for a telephonic interview may be scheduled.

No fee is believed due. However, if a fee is due, please charge the additional fee to Deposit Account 07-0832.

Respectfully submitted,

/Brian J. Cromarty/

By: Brian J. Cromarty
Reg. No. 64018
Phone (609) 734-6804

Patent Operations
Thomson Licensing Inc.
P.O. Box 5312
Princeton, New Jersey 08543-5312
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